

# RESEARCHES ON THE GROWTH RATE OF CARP BROOD (*CYPRINUS CARPIO*, LINNE, 1758) VARIETY WITHOUT SCALES MOLDOVA-PODU ILOAIE GROWN UP IN THE N-E PART OF ROMANIA

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## Abstract

The present research was carried out on brood of carp species (*Cyprinus carpio*, linne, 1758) variety without scales Moldova - Podu Iloaie grown in the NE of the country. In order to achieve the objectives of this work, four lots of carp brood were formed, which were raised in two farms in Iași County. The differences between the 4 groups consisted in the age of the breeders, in the food administered to them, as well as in the larvae, fry and the resulting brood. The present study was conducted over a period of 180 days with the aim of monitoring the growth performance of carp juveniles, by performing periodic weighing and biometric measurements (three times a month), determining the survival rate and the amount of feed needed for growth of carp brood throughout the analyzed period. All four experimental batches consisted of a similar number of specimens in order to obtain conclusive results.

**Key words:** Brood, Carp, Growth rate, Podu Iloaie variety

## INTRODUCTION

In the fish economy of our country, carp plays a very important role, being the most widespread species of fish in our waters. In our country, carp was the first species of fish, in its form of culture, as an object of acclimatization [4]. Cultivated carp was obtained on the basis of wild carp, by selecting and improving environmental and food conditions. This variety of carp has a much better growth rate than that recorded in wild carp [2, 6].

The growth rate of cultivated carp, raised in ponds, is much higher compared to that of wild carp, mainly due to additional feed, genetic potential and optimal environmental conditions [3].

## MATERIALS AND METHODS

The biological material used to carry out this study was represented by the cultured carp (*Cyprinus carpio*) variety "Podu Iloaiei"

without scales, aged 45 days, grown in two fish farms in Iasi County.

Cultivated carp (*Cyprinus carpio*) variety "Podu Iloaiei" is a product of scientific research conducted in the second half of the nineteenth century, in the scientific research stations of Nucet and Podu Iloaiei - Iasi [5].

This study is carried out over a period of 180 days, between May 15 and October 15, 2019 and aimed to monitor the growth performance of brood from this variety of carp, thus populating 4 ponds (C1, C2, C3, C4) with an area of 2 ha each, with a similar number of specimens / ha, brood that was bred until November 15, 2019. To determine the growth performance, the carp brood from the 4 ponds was monitored on a part of the period of 180 days, by direct observations and decadal, by control fishing, through which the rhythm of weight and length growth was followed, respectively the sanitary condition.

The differences between the 4 groups consisted in the age of the breeders from which the carp brood was obtained, in the food administered to them, as well as of the larvae, fry and brood throughout the monitoring period.

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The 4 ponds (C1, C2, C3, C4) were populated with the same number of carp brood specimens, namely 100,000 specimens of carp / pond brood, aged 45 days, obtained from different families. Thus, in the C1 pond, a number of 100,000 specimens of carp hatched with an average individual weight of 0.54 g / ex. which stimulated the development of plankton and administered concentrated feed, pond C2 was populated with the same number of carp offspring an average individual weight of 0.54 g / ex., from carp families consisting of 4 males and females of 5 years, raised in ponds where the development of plankton was stimulated and farm-fed grain was administered.

In the C3 and C4 ponds were also populated with 100,000 specimens of carp brood with an average weight of 0.61 g / ex. It came from carp families consisting of 6-year-old females and 5-year-old males, raised in ponds where only concentrated feed was administered in the case of pond C3, respectively cereal feed designed on the farm in the case of pond C4.

Weighing and measuring the carp brood was performed on the date of the experiment (May 15) and at the end of the experimental period (November 15), as well as during the experiment, every 10 days, to monitor the dynamics of growth in length and weight of the brood in the 4 lots. During the experiments, control weighings were performed to monitor the evolution of body mass and total body length. At each control fishery, 30 specimens of carp fry were caught from each batch, which were measured and weighed.

Two types of granulated compound feed were used to feed the carp brood, which were administered in the form of pressed granules having a diameter between 3 and 5 mm. The feed was administered three times a day, manually on the feeding table. Also in 2 of the experimental ponds the development of plankton was stimulated.

The assessment of the growth rate of the carp juveniles subjected to the research was done by the direct method, it consists in weighing and measuring a group of fish several times during the growing period, in

order to appreciate the total accumulation of body mass and the total length of body.

The accumulation of body mass represents the increase of the body mass of carp specimens in a certain period of time.

Total body mass gain is an index used very often in planning carp production, applied growth technology, carp exploitation time and economic profitability in a fishing unit.

Biometric measurements, which, in our case, are represented by the total body length and body weight at different stages of fish life were performed according to methods in the literature [1].

The total length (L) was measured from the tip of the snout to the tip of the caudal fin lobes.

The survival of the I summer carp brood populated in the 4 breeding ponds was determined as a percentage, at the end of the experimental period.

## RESULTS AND DISCUSSIONS

The level of production obtained at the end of the first summer is given mainly by the quantity and quality of food, natural and supplementary.

The quantity and quality of organisms that form the natural food of cyprinid chicks in the I summer I depend first of all on the natural biogenic capacity of the pond and secondly on the quantity, quality and mode of administration of mineral and organic fertilizers. Thus, in the C1 pond the development of plankton was stimulated and concentrated feed with 38% protein was administered, in the C2 pond only concentrated feed with 38% protein was administered without stimulating the development of plankton, in the C3 pond the development of plankton was stimulated and concentrated feed was administered with 33% protein, and in the C4 pond only concentrated feed with 33% protein was administered.

Feeding of carp carp in the 4 ponds began immediately after the population of the pond, when the water temperature reached a value of about 18°C, with two types of combined granulated fodder, with a diameter between 3 and 5 mm, having the characteristics presented in Table 1.

Table 1 Characteristics and structure of the granulated compound feed used

F1 feed characteristics		F2 feed characteristics	
Crude protein%	38	Crude protein%	33
Gross fat%	6,9	Gross fat%	9
Humidity%	12,1	Humidity%	13
Cellulose%	3,9	Cellulose%	3,5
Content		Content	
Fish meal		SD blood meal	
Soybean meal		Fish meal SP	
Sunflower meal		Fish oil	
Cornflour		Animal protein sources	
Wheat flour		Cereal distillate	
Vitamin-mineral premix		Rapeseed cakes	
		Wheat flour	

The feed was distributed manually, in three daily portions. Throughout the research period, the degree of feed consumption was monitored. The interval between the portions was established according to the water temperature and the body mass of the fish.

When determining the amount of feed administered daily, a number of factors were taken into account such as fish biomass, water temperature and the amount of dissolved oxygen, this representing between 3-5% of the fish biomass existing in the 4 ponds.

Data on the growth rate in length and weight of carp juveniles in summer I are presented in Tables 2 and 3, which are obtained between May 15 and November 15, 2019, by repeated weighing and measurements of carp juveniles in various phases Development. Carp brood was weighed and measured 3 times a month (on the 5th, 15th and 25th of the month), the average values obtained being recorded for each lot.

Table 2 Evolution of weight gain

Species	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>
Pond	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
15.05.2019	0.54 g/ex	0.54 g/ex	0.61 g/ex	0.61 g/ex
25.05.2019	1.05 g/ex	1.01 g/ex	1.21 g/ex	1.09 g/ex
05.06.2019	2.14 g/ex	1.98 g/ex	2.26 g/ex	2.18 g/ex
15.06.2019	3.94 g/ex	3.72 g/ex	4.14 g/ex	3.91 g/ex
25.06.2019	8.40 g/ex	8.09 g/ex	8.11 g/ex	7.94 g/ex
05.07.2019	13.48 g/ex	12.74 g/ex	12.05 g/ex	11.83 g/ex
15.07.2019	18.24 g/ex	17.82 g/ex	17.24 g/ex	15.74 g/ex
25.07.2019	23.18 g/ex	22.07 g/ex	22.02 g/ex	20.19 g/ex
05.08.2019	29.63 g/ex	27.34 g/ex	28.12 g/ex	27.21 g/ex
15.08.2019	34.18 g/ex	32.16 g/ex	32.85 g/ex	29.33 g/ex
25.08.2019	42.31 g/ex	40.45 g/ex	40.28 g/ex	38.01 g/ex
05.09.2019	49.14 g/ex	46.98 g/ex	47.12 g/ex	44.13 g/ex
15.09.2019	53.22 g/ex	50.23 g/ex	51.54 g/ex	49.81 g/ex
25.09.2019	61.44 g/ex	58.66 g/ex	57.49 g/ex	55.24 g/ex
05.10.2019	69.25 g/ex	64.20 g/ex	63.81 g/ex	58.77 g/ex
15.10.2019	74.32 g/ex	68.41 g/ex	65.46 g/ex	61.63 g/ex
25.10.2019	82.19 g/ex	73.04 g/ex	70.11 g/ex	63.06 g/ex
05.11.2019	86.33 g/ex	78.36 g/ex	76.98 g/ex	67.54 g/ex
15.11.2019	92.14 g/ex	83.29 g/ex	79.33 g/ex	71.45 g/ex

When the pond was populated, the average weight of carp juveniles was 0.54 g / ex in the case of C1 and C2 ponds, and 0.61

g / ex in the case of specimens populated in C3 and C4 ponds. For the control fishing carried out on 05.08.2019, average values

between 27.21 g / ex (pond C4) were recorded. and 29.63 g / ex (C1 pond), and the last control fishery was recorded on 15.11.2020, when values between 71.45 g / ex (C4 pond) and 92.14 g / ex were recorded. ex (pond C1). According to the data in table 2, out of the 4 growth pond, the best results regarding the average weight obtained at the end of the growing period, were 92.14 g / ex.

and was obtained in the case of pond C1, in which the development of plankton was stimulated and concentrated feed with 38% protein was administered. The results obtained after measuring the body length of the carp juvenile from the 4 breeding ponds in summer I were within the optimal limits for this age category, the data obtained being presented in table 3.

Table 3 Evolution of the growth spurt in length

Species	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>
Pond	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
15.05.2019	4.21 cm	4.21 cm	4.48 cm	4.48 cm
25.05.2019	4.84 cm	4.75 cm	4.74 cm	4.69 cm
05.06.2019	5.16 cm	5.03 cm	5.12 cm	5.07 cm
15.06.2019	5.63 cm	5.40 cm	5.51 cm	5.44 cm
25.06.2019	6.34 cm	6.12 cm	6.23 cm	6.08 cm
05.07.2019	6.89 cm	6.45 cm	6.54 cm	6.33 cm
15.07.2019	7.26 cm	7.09 cm	7.29 cm	6.99 cm
25.07.2019	8.87 cm	7.96 cm	8.11 cm	7.21 cm
05.08.2019	9.10 cm	8.51 cm	8.73 cm	7.87 cm
15.08.2019	9.33 cm	8.96 cm	9.01 cm	8.44 cm
25.08.2019	10.02 cm	9.45 cm	9.47 cm	8.92 cm
05.09.2019	10.61 cm	9.77 cm	10.01 cm	9.05 cm
15.09.2019	11.14 cm	10.23 cm	10.24 cm	9.62 cm
25.09.2019	11.85 cm	10.81 cm	10.89 cm	9.97 cm
05.10.2019	12.22 cm	11.44 cm	11.48 cm	10.13 cm
15.10.2019	12.75 cm	11.73 cm	11.92 cm	10.45 cm
25.10.2019	13.11 cm	12.19 cm	12.21cm	10.68 cm
05.11.2019	13.35 cm	12.27 cm	12.86 cm	11.04 cm
15.11.2019	13.58 cm	12.39 cm	13.17 cm	11.45 cm

According to the data in table 3, the body length recorded, at the end of the 180 days, in the case of carp brood from the 4 experimental lots showed average values that ranged between 11.45 cm and 13.58 cm, the highest value was recorded in the case of group C1, where the development of plankton was stimulated and concentrated

feed with 38% protein was administered. Throughout the growing period, when determining the necessary feed, the fish biomass, water temperature and the amount of dissolved oxygen in the water were taken into account. The data obtained in the determination of feed consumption for each of the 4 ponds are entered in table 4.

Table 4 Weight gain and feed consumption

Species	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>
Pond	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
Initial weight (g)	0.54	0.54	0.61	0.61
Final weight (g)	92.14	83.29	79.33	71.45
Weight gain (g)	91.6	82.75	78.72	70.84
Amount of feed (kg)	10226	12489	11476	13942

The highest amount of feed (13,942 kg) was administered in the case of the C4 pond, a pond in which the development of plankton

was not stimulated. Regarding the increase in weight gain, it showed values between 70.84 g, as recorded in the case of brood in group

C4 and 91.6 g, as recorded in the case of brood in group C1. At the end of the research period, the losses from the herd were determined, which in this case, due to a good administration of the ponds studied, were relatively low (Table 5).

Table 5 Herd losses recorded for carp brood in the 4 lots

Species	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>	<i>Cyprinus carpio</i>
Pond	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>
Loss %	21.26	26.98	23.19	26.45

## CONCLUSIONS

At the end of the research, the best results for the growth rate in length and weight of carp seedlings were obtained, after as expected, in pond C1, in which the development of plankton was stimulated and concentrated feed with 38% protein was administered, where an average weight of 92.14 g / ex was recorded. and an average length of 13.58 cm.

Cash losses recorded values between 21.26% and 26.45%.

Through this study, the importance of the protein level of the administered fodder was highlighted, respectively of the stimulation of the development of plankton from the breeding ponds in summer I.

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